

ABSTRACT

In order to achieve a long wavelength, 1.3 micron or above, VCSEL or other semiconductor laser, layers of strained quantum well material are supported by mechanical stabilizers which are nearly lattice matched with the GaAs substrate, or lattice mismatched in the opposite direction from the quantum well material; to allow the use of ordinary deposition materials and procedures. By interspersing thin, unstrained layers of e.g. gallium arsenide in the quantum well between the strained layers of e.g. InGaAs, the GaAs layers act as mechanical stabilizers keeping the InGaAs layers thin enough to prevent lattice relaxation of the InGaAs quantum well material. Through selection of the thickness and width of the mechanical stabilizers and strained quantum well layers in the quantum well, 1.3 micron and above wavelength lasing is achieved with use of high efficiency AlGaAs mirrors and standard gallium arsenide substrates.